Listing of Claims:

1. (Currently Amended) A method of using ultrasound waves focused at a specific location in a medium to cause localized production of microbubbles at said location, to control said production, and to control cavitational and heating effects that take place at said location, the method comprising:

providing multiple ultrasonic transducers;

focusing the transducers at said location;

simultaneously directing ultrasound waves from the transducers at said location; and

selecting a range of parameters of the ultrasound waves being directed from the multiple transducers focused at said location in order to ~~improve a likelihood of~~ induce cavitation, and to produce from interference of the ultrasound waves at said location one of:

a waveform comprising high negative peaks and small positive peaks, said waveform encouraging the creation of a cloud of microbubbles;

a waveform encouraging production of heat and limitation of growth and possible implosion of the microbubbles; and

a combined waveform comprising a spatial and/or temporal combination of two waveforms – one waveform comprising

high negative peaks and small positive peaks and the second waveform comprising high positive peaks and only small negative peaks, said combined waveform allowing control of size distribution of the microbubbles and temporal changes of the distribution.

2. (Previously Presented) A method according to claim 1, wherein the waveform encouraging the production of heat is one of:

a waveform comprising high positive peaks and only small negative peaks; and

a sinusoidal waveform.

3. (Previously Presented) A method according to claim 2, wherein the waveform comprising high positive peaks and only small negative peaks encourages reduction of the size of said microbubbles.

4. (Previously Presented) A method according to claim 1, wherein a number of the transducers is three.

5. (Previously Presented) A method according to claim 1, wherein a radius of the microbubbles is in a range from a

fraction of a micron up to 100 or more microns, and preferably between approximately 3 microns to 5 microns.

6. (Previously Presented) A method according to claim 1, wherein a control system measures changes in tissue or microbubble size and accordingly adjusts the waveform to include more negative peaks, more positive peaks, or more equal sized waves.

7. (Previously Presented) A method according to claim 1, further comprising a temperature control system that modifies an output of the transducers according to measured temperature.

8. (Previously Presented) A method according to claim 1, further comprising an ultrasound imaging or non-imaging system that views and monitors the region being targeted, monitors generation of the microbubbles at the desired location, and controls the system for one or more of the following purposes:

so that a number of microbubbles will be as planned;

for aiming a focused beam to the targeted location; and

to re-align the beam to a different location.

9. (Previously Presented) A method according to claim 8, wherein a response at a half harmonic or at higher harmonics of

the transmitted frequencies is used by the ultrasound imaging or non-imaging system to measure one or more of the following:

effect of the heating;

duration of said effect;

number of microbubbles generated within the targeted region; and

spatial distribution of said microbubbles generated within said targeted region.

10. (Previously Presented) A method according to claim 1, wherein the multiple transducers are arranged as an array, designed so that their mechanical focus and their own focus combine at a same point in space.

11. (Previously Presented) A method according to claim 10, wherein the point in space can be moved by either shifting the whole array, by repositioning of individual transducers, or by phase shift of an excitation pulse.

12. (Previously Presented) A method according to claim 10, wherein the ultrasound waves transmitted by the different transducers are designed to produce by interference specific waveforms at a focal point, which are not produced at other locations.

13. (Original) A method according to claim 12, wherein the specific waveforms can be modified to produce one of the following effects:

cause cavitation with no significant change in temperature;

increase the temperature with minimal cavitation;

suppress cavitation; and

a combination of these effects.

14. (Previously Presented) A method according to claim 12, wherein a region within a focal zone of all the transducers in which the specific waveform develops at significant intensities and amplitudes of the waveforms are less than -3 DB of a maximum amplitude, are typically at distances less than 25 mm and preferably less than 1 mm away from a point of said maximum amplitude in lateral directions and less than 10 mm and preferably less than 1.5 mm away in axial directions.

15. (Previously Presented) A method according to claim 1, wherein localized production of microbubbles at the location and control of the cavitational and heating effects that take place at said location are for therapeutic purposes.

16. (Previously Presented) A method according to claim 1, wherein the array is placed extra-corporally, in close proximity

to an organ to be treated, with ultrasound gel or water surrounding the ultrasound transducers and space between it and the organ.

17. (Previously Presented) A method according to claim 15, wherein the therapy is at least one of:

occlusion of varicose veins and telangiectasia;

activation of cellular processes in a body, by either localized pressure forces or shear forces that produce therapeutic responses or damage;

therapy of cancerous tissue by cavitation damage and/or rapid hyperthermia, resulting in apoptosis, tissue ablation or necrosis;

therapy of cancerous tissue by damage and closure of supply and drainage vasculature by cavitation, and/or rapid hyperthermia via coagulation of arteries supplying a tumor;

ablation of ectopic foci or re-entry loops within cardiac walls, mainly within ventricular walls;

thrombolysis of clotted or semi-clotted arteries, lipolysis or other methods of disintegration of fat cells, either by a mechanism of microbubbles collapse and/or by hyperthermia, resulting in apoptosis and drainage of fat deposits;

coagulation of internal bleedings within the body; and

non-invasive surgery of internal tissues and organs, by disintegration of cells along a cut.

18. (Previously Presented) A method of occlusing varicose veins comprising the steps of:

a) focusing multiple transducers at a same location within a vein;

b) selecting a range of parameters of said multiple transducers to produce a waveform comprising high negative peaks and small positive peaks, said waveform encouraging creation of a cloud of microbubbles;

c) continuing production of the waveform until cavitation causes destruction of cells and initiation of scaring of tissue at said location;

d) focusing said transducers at another location within said vein;

e) repeating steps (b), (c) and (d) until enough scaring has been initiated to cause occlusion of said vein.

19. (Previously Presented) A method according to claim 18, wherein two additional steps are added between steps (c) and (d), said steps comprising:

f) changing the range of parameters of the multiple

transducers to produce a heating waveforms, said waveform encouraging production of heat at the location; and

g) continuing the production of the waveform until the heating causes destruction of cells and initiation of scaring of the tissue at said location.

20. (Previously Presented) A method according to claim 17, wherein activation of cellular processes in the body produces therapeutic responses or damage, including at least one of:

localized drug delivery,

gene therapy, and

angiogenesis.

21. (Previously Presented) A method according to claim 17, wherein thrombolysis of clotted or semi-clotted arteries is performed in arteries chosen from at least one of:

coronary arteries,

carotid arteries,

cerebral arteries, and

peripheral arteries.

22. (Original) A system for carrying out the method of claim 1, said system comprising:

three or more arbitrary waveform signal generators;

three or more wide-band power amplifiers;

three or more transducers; and

one workstation.

23. (Previously Presented) A system according to claim 22, wherein the three or more transducers are arranged as an array, designed so that their mechanical focus and their own focus combine at a same point in space.

24. (Previously Presented) A system according to claim 23, wherein the point in space can be moved by either shifting the whole array, by repositioning of individual transducers, or by phase shift of an excitation pulse.

25. (Previously Presented) A system according to claim 23, wherein the ultrasound waves transmitted by the three or more transducers are designed to produce by interference specific waveforms at a focal point, which are not produced at other locations.

26. (Original) A system according to claim 25, wherein the specific waveforms can be modified to produce one of the following effects:

cause cavitation with no significant change in temperature;

increase the temperature with minimal cavitation;

suppress cavitation; and

a combination of these effects.

27. (Previously Presented) A system according to claim 25, wherein a region within a focal zone of all the transducers in which the specific waveform develops at significant intensities and amplitudes of the waveforms are less than -3 DB of a maximum amplitude, are typically at distances less than 25 mm and preferably less than 1 mm away from a point of said maximum amplitude in lateral directions and less than 10 mm and preferably less than 1.5 mm away in axial directions.

28. (Original) A system according to claim 22, further comprising an ultrasound imaging or non-imaging system and a control box.

29. (Previously Presented) A system according to claim 28 further comprising the ultrasound imaging or non-imaging system that views and monitors the region being targeted, monitors generation of the microbubbles at the desired location, and controls the system for one or more of the following purposes:

so that the number of microbubbles will be as planned;

for aiming the focused beam to the targeted location; and

to re-align the beam to a different location.

30. (Original) A system according to claim 28, wherein the response at the half harmonic or at higher harmonics of the transmitted frequencies is used by the ultrasound imaging or non-imaging system to measure one or more of the following:

the effect of the heating;

the duration of said effect;

the number of microbubbles generated within the targeted region; and

the spatial distribution of said microbubbles generated within said targeted region.

31. (Original) A system according to claim 28, wherein the ultrasound imaging or non-imaging system is controlled by the workstation to which it is connected through the control box.

32. (Previously Presented) A system according to claim 28, wherein the ultrasound imaging or non-imaging system measures the changes in tissue or the microbubbles size and the control box and workstation accordingly adjust the waveform to include more negative peaks, positive peaks or equal sized waves.

33. (Original) A system according to claim 22, further comprising a temperature measurement system.

34. (Original) A system according to claim 33, wherein the temperature measurement system comprises one or more thermocouples.

35. (Original) A system according to claim 33, wherein the temperature measurement system is used to modify the output of the transducers according to the measured temperature.

36. (Previously Presented) A system according to claim 23, adapted for use in a therapeutic procedure;

wherein the array is placed extra-corporally, in close proximity to an organ to be treated, with ultrasound gel or water surrounding the ultrasound transducers and the space between it and the organ.

37. (Previously Presented) A system according to claim 36, wherein the therapeutic procedure is at least one of:

occlusion of varicose veins and telangiectasia;

activation of cellular processes in the body, by either localized pressure forces or shear forces that produce therapeutic responses or damage;

therapy of cancerous tissue by cavitation damage and/or rapid hyperthermia, resulting in apoptosis, tissue ablation or necrosis;

therapy of cancerous tissue by damage and closure of the supply and drainage vasculature by cavitation, and/or rapid hyperthermia via coagulation of the arteries supplying the tumor;

ablation of ectopic foci or re-entry loops within the cardiac walls, mainly within the ventricular walls;

thrombolysis of clotted or semi-clotted arteries, lipolysis or other methods of disintegration of fat cells, either by the mechanism of microbubbles collapse and/or by hyperthermia, resulting in apoptosis and drainage of fat deposits;

coagulation of internal bleedings within the body; and

non-invasive surgery of internal tissues and organs, by disintegration of cells along the cut.